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VADOSIAPUS COPACABANUS, A NEW GENUS AND SPECIES OF EXOEDICEROTIDAE FROM BRAZIL (CRUSTACEA, AMPHIPODA)

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Abstract.—*Vadosiapus copacabanus,* n. gen. is described from the surf zone on the beach at Copacabana, Rio de Janeiro, Brazil. The genus and unique species is related to the three known species of *Bathyporeiapus,* which range southward from Brazil through the Magellan region of South America. *Vadosiapus* is distinguished from *Bathyporeiapus* in the odd phoxocephalid-like article 3 of the mandibular palp, the nonsinuate epimeron 2, the broadened telson bearing only midsagittal armaments and the enlarged dactyl of gnathopod 2.

Bathyporeiapus is a temperate South American genus of 3 species (see below), ranging from Santos, Brazil into the Magellanic region. These species generally live on coarse sand in heavy surf zones. *Bathyporeiapus* belongs to the Exoedicerotidae (Barnard & Drummond 1982), a family considered to be more primitive than, but not necessarily directly ancestral to, the Oedicerotidae. The Exoedicerotidae now have 11 genera with 19 species and probably all are very shallow surf-zone species. The Oedicerotidae, with 188 species in 30 genera, have only a few surf-zone species (especially in *Synchelidium* and *Monoculodes*), but has generally radiated widely into deeper and calmer waters and into the abyss.

The Exoedicerotidae are primarily confined to "Gondwanan" seas except for 3 species which have penetrated into the tropics. Oedicerotidae are richly represented in all seas and bear the apomorphic distinctions of fused eyes or loss of eyes and the loss of apical armaments on uropods 1–2.

We present (1) two updated keys to the genera of Exoedicerotidae, the second key of which emphasizes adult male characters of spine fields on the gnathopods; (2) an updated key to the species of and a revised diagnosis of *Bathyporeiapus* in the style to be presented soon in Barnard and Karaman's "The Families and Genera of Marine Gammaridea." Biogeographic code numbers in brackets and Professor Stock's classification of setae on the mandibular palp are described in Barnard & Barnard (1983).

Key 1 to the Genera of Exoedicerotidae

1. Uropod 3 composed of peduncle only ..... *Metoediceros*
– Uropod 3 with 1–2 rami 2
2. Uropod 3 with 1 ramus *Notoediceros*
– Uropod 3 with 2 rami 3
3. Gnathopods well developed 4
– Gnathopods mittenform or inferior 7
4. Epimera 1–3 with many marginal setae ..... *Patuki*
– All setae, if present, on epimera 1–3 facial, not marginal 5
5. Pereopods 3–4 with large dactyl, setae sparse ... *Metoediceropsis* male
– Pereopods 3–4 with dactyl vestigial, setae dense 6
6. Gill of coxa 5 small or vestigial, primary flagellum of antenna 1 with diverse armament, male and female gnathopods diverse ..... *Exoediceros*
– Gill 5 ordinary, armament of pri-

mary flagellum on antenna 1 homogeneous, gnathopods of both sexes alike ..... *Exoediceroides*

7. Molar feeble, simple, conical, not triturative, with apical spine .... *Exoediceropsis*
- Molar strong, triturative 8
8. Inner plate of maxilla 2 widely setose, maxilla 2 with submarginal facial inner setal row, dactyls of pereopods 3–6 ordinary 9
- Inner plate of maxilla 1 naked, maxilla 2 lacking facial or submarginal inner row of setae, dactyls of pereopods 3–6 vestigial .. 10
9. Uropod 3 dominant, much larger than uropod 1, strongly spinose . ..... *Parhalimedon*
- Uropod 3 ordinary, lacking major spines ..... *Kanaloa*
10. Epimeron 2 with posteroventral tooth, article 3 of mandibular palp not beveled, with A–B or D setae besides E-setae ..... *Bathyporeiapus*
- Epimeron 2 lacking tooth, article 3 of mandibular palp beveled, lacking A–B setae, all setae (E) on bevel ..... *Vadosiapus*

Key 2 to the Genera of Exoedicerotidae (Especially Adult Males)

1. Male gnathopods with spine fields on propodi near apices of dactyls 2
- Male gnathopods lacking propodal spine fields 3

2a. Uropod 3 with 2 rami .. *Exoediceros*
b. Uropod 3 with 1 ramus .... *Notoediceros*
c. Uropod 3 lacking rami .... *Metoediceros*

3. Gnathopods ordinary, large 4
- Gnathopods mittenform or gnathopod 2 almost simple .... couplet 7 of Key 1

4. Epimera 1–3 with many marginal setae ..... *Patuki*
- All setae of epimera 1–3, if present, facial ..... *Exoediceroides*

Bathyporeiapus Schellenberg

Bathyporeiapus Schellenberg, 1931:154 (*Bathyporeiapus magellanicus* Schellenberg, 1931, monotypy).

Description.—Rostrum of moderate length, acute or downturned. Eyes bilateral, small. Article 3 of antenna 1 elongate, flagellar articles and armaments not diverse in type, weakly so in one species. Accessory flagellum "absent."

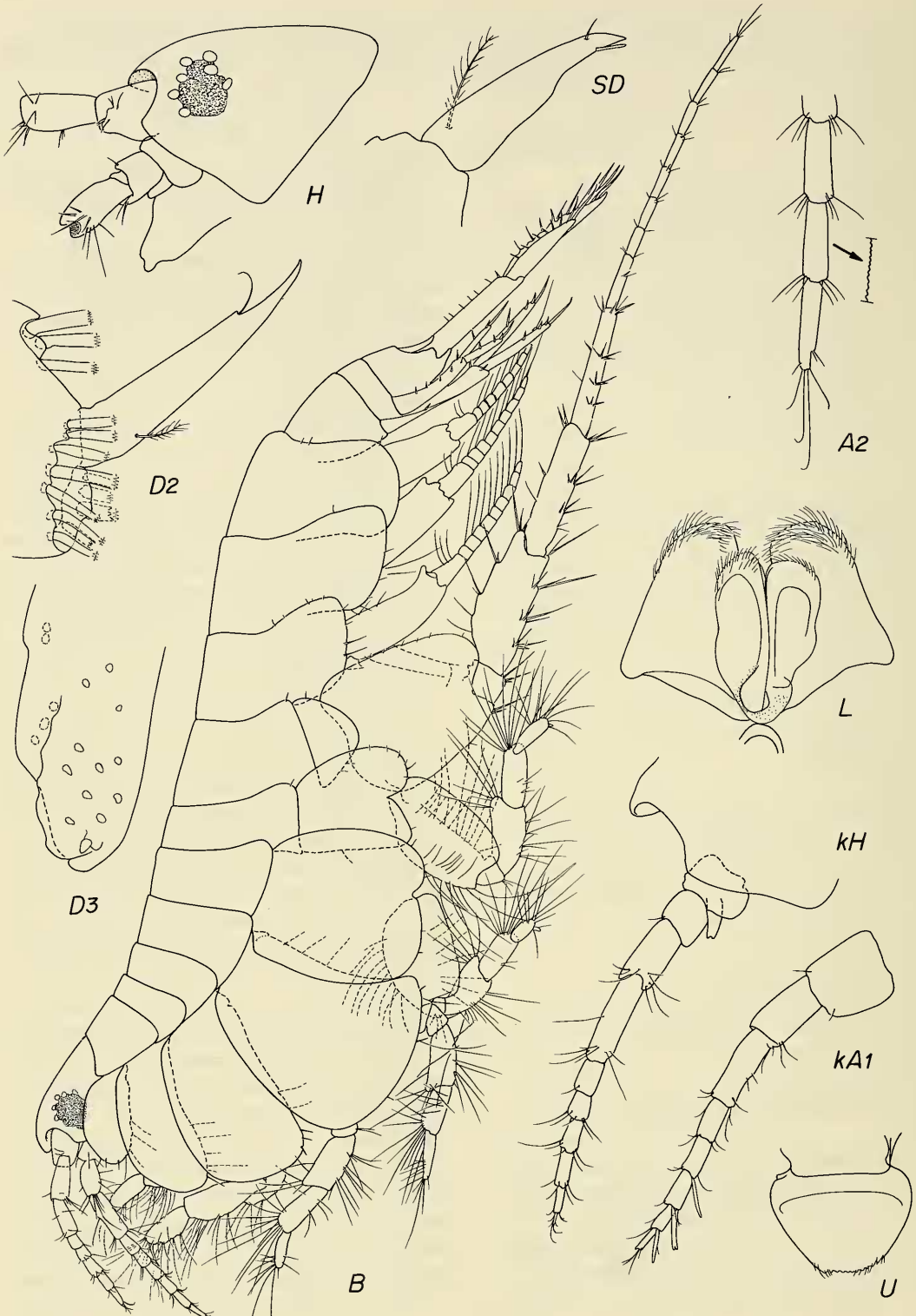
Cutting edge of mandible projecting and weakly toothed; molar large, weakly ridged; palp article 3 short, clavate or sublinear, without beveled apex, with A–B and D setae on sides of article 3. Inner plate of maxilla 1 lacking setae, outer plate with 7–9 spines. Plates of maxilla 2 strongly distinct in size, inner plate setose medially but without facial row of setae. Dactyl of maxilliped unguiform and long.

Coxae 1–4 large, coxa 5 scarcely shorter than coxa 4.

Gnathopods diverse, ?not sexually dimorphic, feeble, gnathopod 1 barely subchelate, carpus not lobate, much longer than propodus, latter expanded, palm oblique, gnathopod 2 much longer than gnathopod 1, simple, slender, carpus not lobate, very elongate, propodus also elongate; dactyl of gnathopod 2 vestigial; palms without spine fields.

Dactyls of pereopods 3–4 vestigial or absent. Dactyls of pereopods 5–6 vestigial, of pereopod 7 multiarticulate; article 2 of pereopod 7 broad but scarcely lobate posteroventrally. Gill of pereopod 5 [?ordinary].

Epimera 1–2 with setae on margins, epimeron 2 with tooth, epimeron 3 naked. Extension of uropods 1–3 diverse; uropod 2 shortest; uropod 2 not exceeding end of peduncle on uropod 3. Uropod 3 well developed but not huge, with 2 well developed rami, peduncle longer than rami of uropod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2. Telson not broader than long, apical armaments bilateral.

Relationship.—Differing from *Exoediceros* and *Exoediceroides* in the feeble, diverse gnathopods, with vestigial to moderate dactyl on gnathopod 2, lack of setae on the inner plate of maxilla 1, lack of facial setal row on the inner plate of maxilla 2, and the elongate article 3 of antenna 1.

Species.—*bisetosus* Escofet, 1970, 1971 [753]; *magellanicus* Schellenberg, 1931 [864]; *ruffoi* Escofet, 1971 (=sp. Ruffo 1956) (=*magellanicus* ID of Varela, 1983) [751–753].

Marine, Santos, Brazil to Magellan region, shallow water sands, 3 species.

Key to the Species of *Bathyporeiapus* and *Vadosiapus*

1. Epimeron 2 not sinuate posteriorly, article 3 of mandibular palp lacking apicolateral ("A–B") setae, all setae on apical bevel, dactyl of gnathopod 2 well developed, telson broad, uropod 3 huge ..... *V. copacabanus*
– Epimeron 2 sinuate posteriorly, article 3 of mandibular palp with apicolateral ("A-B") setae, apex poorly beveled, dactyl of gnathopod 2 weak, telson narrow, uropod 3 ordinary 2
2. Rostrum strongly downturned apically, antennae and pereopods very setose, article 1 of primary flagellum (conjoint) as long as next 3 articles, apex of propodus on gnathopod 2 extremely setose and hiding vestigial dactyl, telson with 9–10 major apical and dorsal setae, dactyl of pereopod 7 with 15 articles .. *B. ruffoi*
– Rostrum not strongly downturned apically, antennae and pereopods moderately setose, article 1 of primary flagellum of antenna 1 not longer than succeeding articles, apex of propodus on gnathopod 2 well setose but not hiding small dactyl, telson with 6 or fewer major setae, dactyl of pereopod 7 with fewer than 11 articles 3
3. Pereopods 3–4 (?with vestigial dactyl), telson with 6 apical setae increasing in length towards middle, dactyl of pereopod 7 with 8–10 articles, mandibular raker absent, uropodal spination sparse ..... *B. magellanicus*
– Pereopods 3–4 lacking dactyl, telson with 2–4 short major apical setae, of subequal length, dactyl of pereopod 7 with 5–8 articles, mandibular rakers 2, uropodal spination strong, dense ..... *B. bisetosus*

Vadosiapus, new genus

Type species.—*Vadosiapus copacabanus*, n. sp.

Etymology.—L., vadosi, shallower; L., apus, purulent, from the polluted type locality. Masculine.

Description.—Rostrum of moderate length, acute or downturned. Eyes bilateral, small. Article 3 of antenna 1 elongate, flagellar articles and armaments not diverse. Accessory flagellum "absent."

Cutting edge of mandible projecting and weakly toothed; molar large, weakly ridged; palp article 3 short, sublinear, apex beveled, all setae on apex. Inner plate of maxilla 1 lacking setae, outer plate with 7 spines. Plates

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Fig. 1. *Vadosiapus copacabanus:* unattributed figures = female holotype (USNM 195182), "i" 2.58 mm; k = male "k" 2.69 mm. Capital letters refer to parts; lower case letters to left of capital letters refer to specimens and to the right refer to adjectives as described below: A, Antenna; B, Body; D, Dactyl; G, Gnathopod; H, Head; I, Inner plate or ramus; K, Seta; L, Labium; M, Mandible; P, Pereopod; R, Uropod; S, Maxilliped; T, Telson; U, Upper lip; W, Pleon; X, Maxilla; Y, Oostegite; Z, Gill; m, Medial; r, Right; t, Left.

of maxilla 2 strongly distinct in size, inner plate setose medially but without facial row of setae. Dactyl of maxilliped unguiform and long.

Coxae 1–4 large, coxa 5 scarcely shorter than coxa 4.

Gnathopods diverse, ?not sexually dimorphic, feeble, gnathopod 1 barely subchelate, carpus not lobate, much longer than propodus, latter expanded, palm oblique; gnathopod 2 much longer than gnathopod 1, simple, slender, carpus not lobate, very elongate, propodus also elongate; dactyl of gnathopod 2 moderately developed; palms without spine fields.

Dactyls of pereopods 3–4 vestigial or absent. Dactyls of pereopods 5–6 vestigial, of pereopod 7 multiarticulate; article 2 of pereopod 7 broad but scarcely lobate posteroventrally. Gill of pereopod 5 ordinary.

Epimera 1–2 with setae on margins, epimeron 2 lacking tooth, epimeron 3 naked. Extension of uropods 1–3 diverse; uropod 2 shortest; uropod 2 not exceeding end of peduncle on uropod 3. Uropod 3 very large, with 2 well developed rami, peduncle longer than rami of uropod 2. Telson broader than long, with single midapical armament.

Relationship.—Differing from *Exoediceros* and *Exoediceroides* in the feeble diverse gnathopods, with vestigial to moderate dactyl on gnathopod 2, lack of setae on the inner plate of maxilla 1, lack of facial row on the inner plate of maxilla 2, and the elongate article 3 of antenna 1.

Differing from *Bathyporeiapus* in the sublinear article 3 of the mandibular palp bearing only E setae on the bevel, in the lack of a tooth on epimeron 2, the enlarged uropod 3 which greatly exceeds the apex of uropod 2, the broad telson with a single midapical armament (versus bilateral armaments), and the much larger dactyl of gnathopod 2.

Species.—*copacabanus* Barnard & Thomas, herein [751].

Marine, shallow water sands, Rio de Janeiro, Brazil, 1 species.

Vadosiapus copacabanus, new species
Figs. 1–3

Holotype.—Deposited in the National Museum of Natural History (USNM), Washington, D.C., USNM 195182, female "i" 2.58 mm.

Type locality.–Brazil, Rio de Janeiro, Copacabana Beach, 3 May 1985, 45 m seaward from swash zone, depth 3.5 m, coarse quartz sediment, coll. J. D. Thomas and J. L. Barnard.

Material.—Type locality, paratypes, female "j" 2.47 mm, female "k" 2.69 mm, female "n" 2.52 mm and 2 other female specimens.

Etymology.—From the beach in Rio de Janeiro.

Diagnosis (in comparison to species of *Bathyporeiapus*).—Rostrum not strongly downturned apically; article 1 on primary flagellum of antenna 1 not conjoint; right and left mandibles each with large, linguiform lacinia mobilis, no rakers; article 3 of mandibular palp linear, apically beveled, all setae situated on bevel; dactyl of gnathopod 2 better developed than in other species; dactyls of pereopods 3–4 extremely vestigial; dactyl of pereopod 7 with about 8 articles; epimeron 2 convex posteriorly; telson broader than long, with stout apical spine in middle, with pair of lateral setae on each side.

Description (of holotype, female "i" 2.58 mm).—Eyes in alcohol purplish, with few clear ommatidia. Apex of upper lip truncate and scaled. Right and left mandibles almost identical. Mandibular lobes of lower lip very short. Inner plate of maxilla 1 small, naked, outer plate with 7 spines, palp article 2 with 8 setae. Inner plate of maxilla 2 narrower than outer plate, sparsely but fully setose medially, outer plate with 2 apicolateral setae. Inner plate of maxilliped with 7 setae, no locking spine; outer plate with 7 main medial spines and groups of ventral clavate setae, dactyl unguiform, with short nail.

Coxae 1–4 strongly increasing in size con-

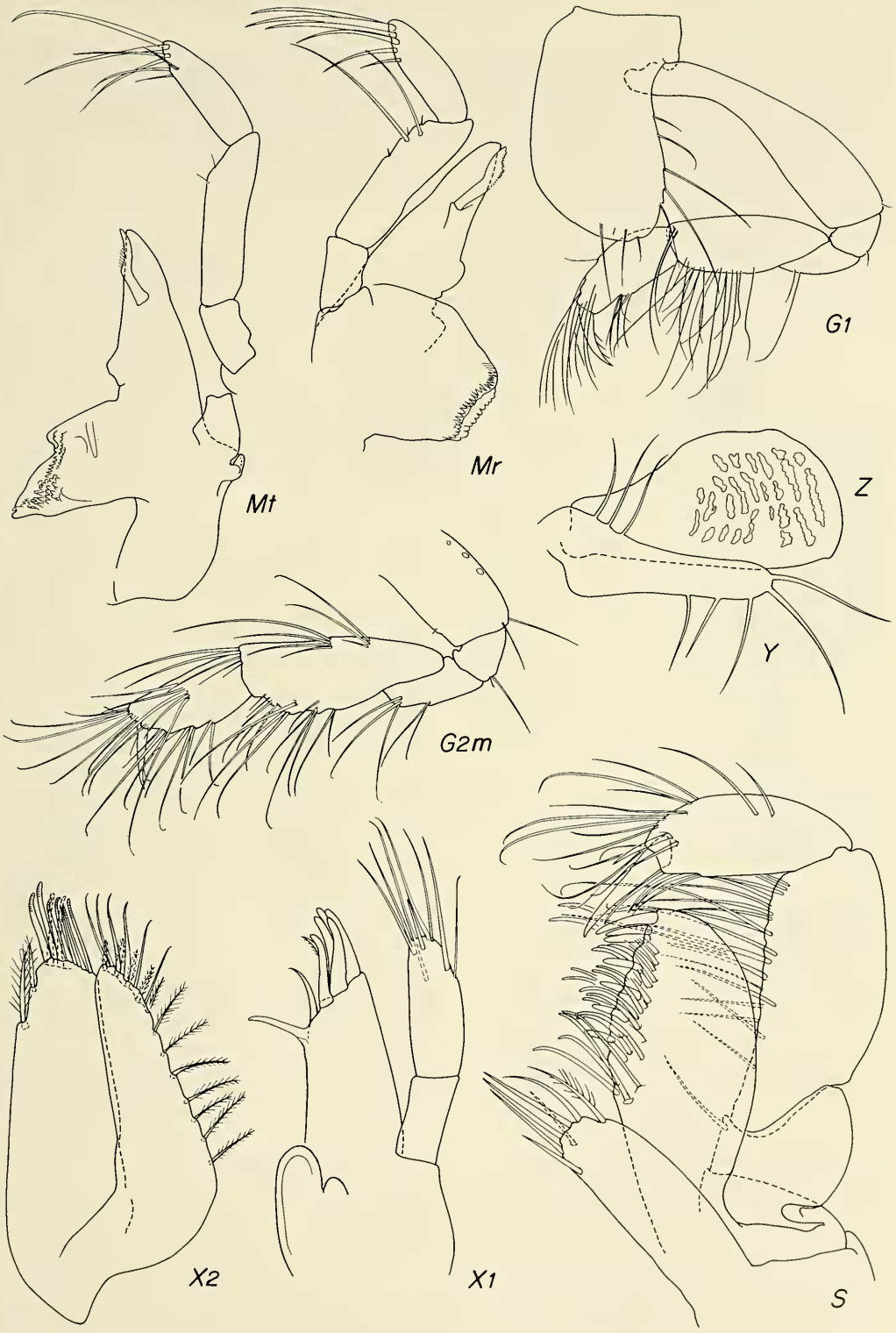

Fig. 2. *Vadosiapus copacabanus:* female holotype (USNM 195182), "i" 2.58 mm. Letter codes, see Fig. 1.

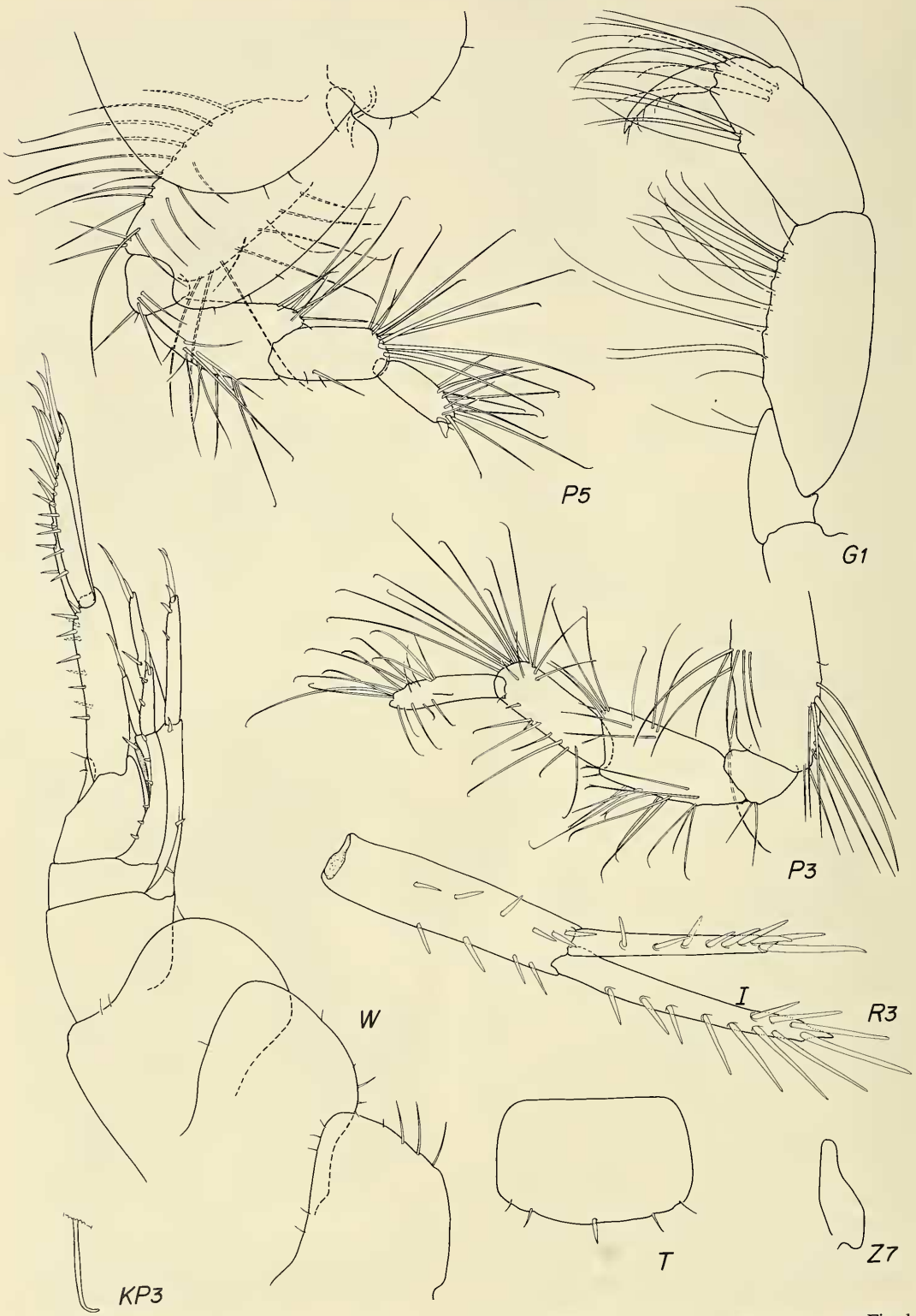

Fig. 3. *Vadosiapus copacabanus:* female holotype (USNM 195182), "i" 2.58 mm. Letter codes, see Fig. 1.

secutively, with sparse posterior setae, coxa 4 weakly excavated posteriorly, coxa 5 almost as long as 4. Gnathopods feeble, shapes weakly distinct, setation patterns strongly distinctive, gnathopod 1 simple, carpus anteriorly naked; gnathopod 2 scarcely subchelate, with propodal hump distal to dactyl, carpus setose anteriorly.

Dactyls of pereopods 3–4 vestigial or absent, pereopod 4 like 3 (thus 4 not illustrated). Dactyls of pereopods 5–6 very small, pereopod 6 like 5 but larger. Dactyl of pereopod 7 divided into 8 parts (articules). Gills on coxae 2–7, gill of coxa 7 very small (illustrated same magnification as pereopod 7); oostegites very thin and sparsely setose, present on coxae 2–5.

Pleopods well developed, similar to each other, peduncles about 2.8 times as long as wide, rami equal to each other in length, about 1.20 times as long as peduncle, outer rami with 10–11 articles, inner with 11, each peduncle with 2 coupling hooks, peduncle of pleopods 1–2 with apicolateral cusp. Epimera 1–2 rounded quadrate, 3 rounded posteroventrally, epimeron 1 with 5 ventral setae, epimeron 2 with 4 weak ventral setae, epimeron 3 naked ventrally. Peduncle of uropod 1 with 3 dorsolateral spines, medially with 3, of uropod 2 with 6 lateral spines, medially with one; each ramus of uropods 1–2 with 2 apical spines, outer rami with 2 marginal spines, inner with 1 and 0. Peduncle of uropod 3 with 6 dorsolateral and 4 dorsomedial spines, rami styliform or rod-like, outer much shortened, both richly spinose continuously to apex. Telson much shorter than broad, with single midapical spine and 2 penicillate setules in tandem on each side.

Female "j".—Palp article 2 of maxilla 1 with 7 elements, outer plate with 8 spines.

Female "k".—Palp article 2 of maxilla 1 with 5 elements, outer plate with 8 spines.

Male.—Unknown.

Relationship.—Differing from the species in *Bathyporeiapus* also in the dominant armament of the telson being a single medial spine, and the large lacinia mobilis on each mandible.

Couplet 2 of the key above lists characters for *B. ruffoi* all of which also differentiate it from *V. copacabanus.*

The species is perplexing in the condition of article 3 on the mandibular palp and departs most radically from "typical" *Bathyporeiapus* in that character.

Distribution.—Brazil, Rio de Janeiro, 3 m.

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